Appendix A. Sediment Model Assumptions and Documentation

Introduction

An attempt to calculate sediment yield from watersheds, and delivery to streams, will provide relative rather than exact sediment yields (Harvey 2000a). The calculations presented in this section attempt to account for all significant sources of sediment separately. This approach is used to identify the primary sources of sediment in a watershed. This identification of primary sources for TMDL streams will be useful as implementation plans are designed and developed to remedy these sources.

Two sediment loading rates are calculated for Priest River Subbasin watersheds where a TMDL is warranted: an estimated natural or background loading rate prior to Euroamerican settlement and land use activities within the basin, and the current sediment loading rate. Figure A1 presents a conceptual diagram of the relationship between the increase of a current sediment load over natural load as it relates to an impact on cold water aquatic life (CWAL) beneficial use. Current sediment load in all Priest River watersheds will be higher than natural conditions simply because of the timber road system. The measurements of stream biology may suggest Full Support at the estimated current sediment load, or the stream biology may suggest Not Fully Supporting of CWAL. In the latter case an estimation is made as to whether the current sediment load has played a significant part in CWAL impairment. There may be other reasons for impairment such as poor instream cover and lack of quality pools associated with low amounts of LWD (linked perhaps to historic riparian harvests). Other factors may be water temperature and fishery management issues such as introduction of non-native species.

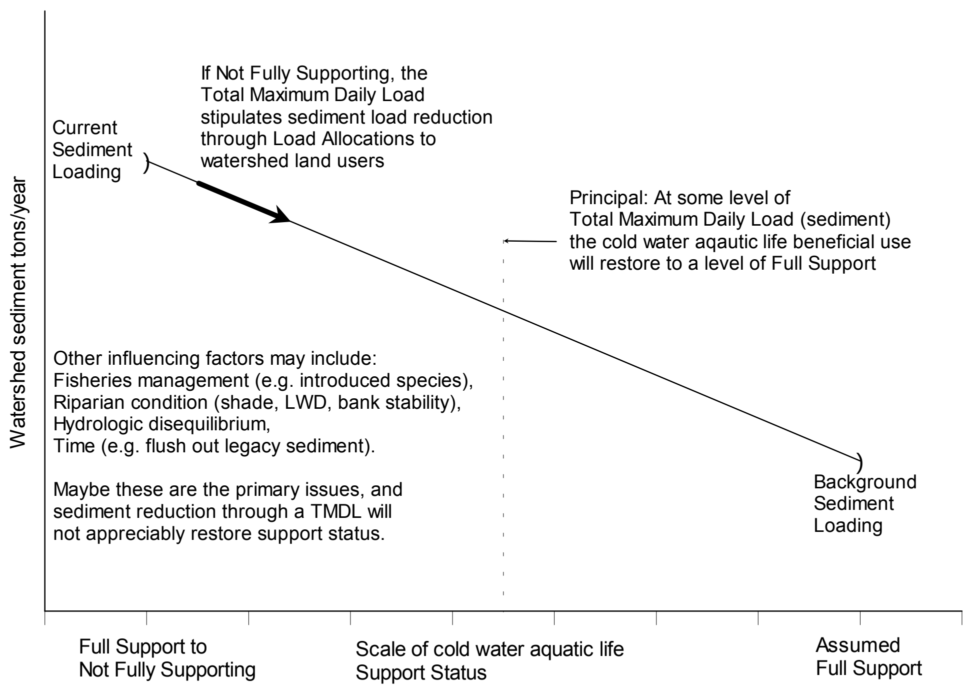

Figure A1. Conceptual diagram of sediment TMDL in association with cold water aquatic life beneficial use.

For a sediment TMDL, the goal is to reduce the current watershed load to a point where cold water aquatic life will exhibit full support. Questions may arise as to whether sediment load reduction in itself will lead to restoration of full support without other management actions, or if other management actions should take priority over sediment load reduction as a means to achieve full support.

A.1 Natural or Background Sediment Load

Forest Land

The USFS supplied to DEQ a GIS base geology and landtype map of the Priest River Subbasin in order to calculate background sediment load (Figure A2, Niehoff *pers comm*). Landtypes are units of classification based on local geomorphology, hydrology, and soils characteristics. Each landtype is assigned a sediment yield in tons/square mile area/year. These yield rates are used in the Forest Service WATSED Model for planning land management activities.

A point or emphasis is made here on the use of WATSED landtype coefficients to calculate Forest Land sediment load for Priest River Subbasin TMDLs. The WATSED model provides useful information to identify sources of sediment and compare management alternatives (EPA 2001a). The model design was not intended to predict specific quantities of sediment yield for applications such as a TMDL. In the EPA comment package to the draft *Priest River SBA and TMDL* (EPA 2001a), it was cited that the development origin of WATSED and related R1/R4 models was for the Idaho Batholith (USFS 1981), and that extrapolation outside of the Idaho Batholith should be made with extreme caution. Also cited was that calibration and validation does not exist for Kaniksu granitic and Belt series metamorphic geology's (USFS 1981, Ketcheson *et al*. 1999). However, the use of WATSED coefficients for sediment yield estimates from Forest Land is clearly the best of options available for TMDL development in northern Idaho, and there has been some field trials of sediment yield from various landtypes within the Idaho Panhandle National Forests (Niehoff *pers comm).*

The GIS coverage supplied by the USFS was a base map of low sediment hazard landtypes, including these examples common within the subbasin: Belt/Granitic Outwash Plain and Alluvial Deposits (typically gentle sloped, Bonner soils) at 11 tons/mi^2/yr; High Elevation, Residual Belt Mt. Slopes and Ridges at 13 tons/mi^2/yr; and High Elevation, Glaciated Granitic Mt. Slopes and Ridges at 23 tons/mi^2/yr (Figure A2). The base map was overlain with sensitive landtypes ranging from moderate to high sediment hazard. Some common examples in the basin include: Highly Weathered, Dissected, Residual Granitic Bottoms and Toeslopes at 32 tons/mi^2/yr; Dissected, Residual Belt Mt. Slopes at 36 tons/mi^2/yr; Lacustrine Stream Channels at 41 tons/mi^2/yr; and Non-Dissected, Belt Stream Breaklands at 59 tons/mi^2/yr. Landtype units take into account historical, non-forested lands such as wet meadows.

Acreage within each watershed was partitioned to each base or sensitive landtype. Within landtype partitions the watershed acreage was further separated into ownership/management groups, and then land use subgroups such as improved hay land within private ownership. The WATSED sediment yield coefficients were applied to square miles of each partition resulting in tons/yr. Adding up the partitions resulted in watershed tons/yr as background sediment load. Dividing total watershed tons/yr by watershed area results in a weighted mean tons/mi^2/yr sediment yield for the watershed.

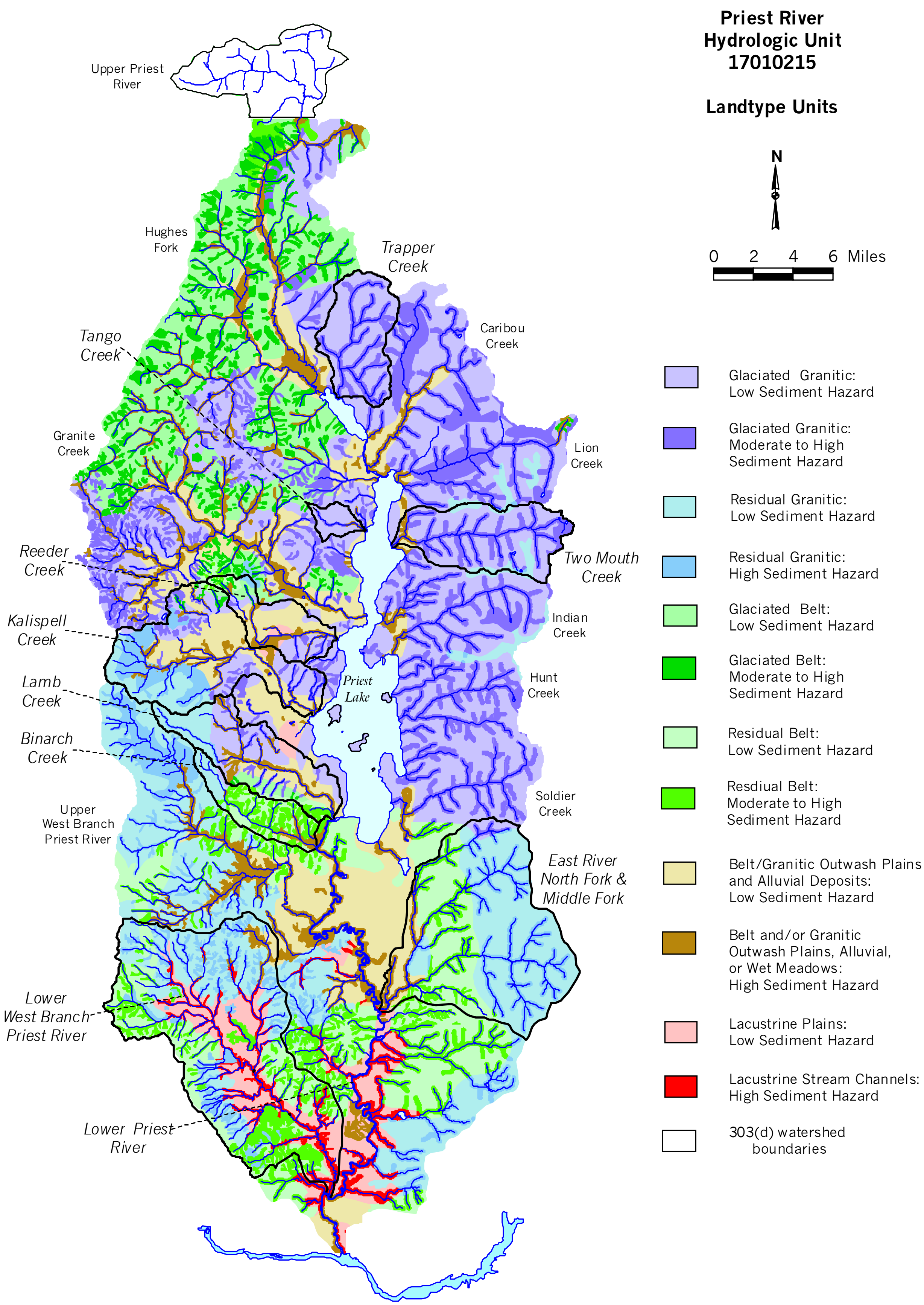

Figure A2. Landtype units in the Priest River Subbasin (data supplied by the USFS).

The WATSED model does not assume that sediment yield means 100% delivery to watershed streams. WATSED uses a "routing coefficient" applied to yield to reduce the estimated amount of sediment delivered to streams. The routing coefficient equation is based on watershed size. The larger the watershed, the smaller the routing coefficient applied to yield, and less relative sediment delivery to streams. Sediment load calculations for most DEQ - TMDL documents have used the assumption of 100% delivery to streams (Harvey 2000b). Priest River Subbasin TMDLs will take the same approach.

Fire

The historic cycle of wildland fires was the prevailing disturbance in the natural setting of the basin. Estimates and records of fires between 1880 - 1940 were presented in the *Priest River SBA and TMDL*, Section 2 and 3, including large areas of western watersheds with intense multiple burns (Rothrock 2001). It is felt by some USFS scientists that because of the widespread volcanic ash cap, intense multiple fires would not have led to an appreciable increase in sediment yield. Instead, a hydrophobic condition may have developed with very intense fires, and this may have led to excess water yields and flooding which caused stream channel damage. Such conditions are speculated for damage in upper reaches of Lamb Creek and Upper West Branch during the early 1900s (USFS 1999).

Mass Failures

The basin wide IDL - CWE analysis produced mass failure hazard ratings mostly averaging from moderate to high. This analysis is based on GIS maps related to a matrix table of slope categories and predominant bedrock/parent material. But, CWE mass failure scores within watershed sections observed in field surveys were generally "low." From observations by USFS and IDL personnel, the natural or historic occurrence of landslides would appear to have been minor with exceptions such as the canyon walls of Lower West Branch and Lower Priest River. The WATSED methods for sediment coefficients do not calculate landslides separately, but the landtype sediment coefficients do incorporate landslide estimates. Thus, a separate estimate for slides in the TMDL sediment load calculations would result in an overestimation by counting landslides twice. For example, the high sediment hazard landtype Lacustrine Stream Channels at 41 tons/mi^2/yr, common along the lower channel sections of lower basin streams, reflects a layer of gravelly silt or sandy loam overlaying a clay layer, a condition with a propensity toward slides (Niehoff *pers comm)*. Another example is the moderate sediment hazard landtype Dissected, Glaciated Granitic Mt. Slopes at 39 tons/mi^2/yr, common along east side stream channels draining into Priest Lake, which in part reflects granitic soil movement on steep slopes.

A.2 Current Sediment Load

Summary

Several methods of calculation went into the estimates of current sediment yield to streams given various land use conditions. As a composite, these individual calculation methods might be called a model for watershed sediment load within the Priest River Subbasin. The series of sediment calculation methods presented here are similar to those used in other northern Idaho TMDLs, including those for the Coeur d'Alene Subbasin (Harvey 2000a and 2000b), and the

Pend Oreille Subbasin (Bergquist 2000). Areas where methods for the Priest River Subbasin are different or modified from other northern Idaho TMDLs are noted. A summary listing of sediment sources considered and methods of yield calculations are as follows:

- *Forested acres (watershed area minus roads and agricultural land)*: WATSED landtype sediment yield coefficients.
- *Unpaved road stream crossings*: IDL – CWE road sediment scores at stream crossings converted to tons delivered to streams based on research in LeClerc Creek, Washington.
- *Unpaved road segments other than stream crossings*: CWE road sediment scores converted to delivered tons of sediment.
- *Road prism mass failures*: based either on USFS road maintenance experiences and observations of failures and estimated sediment yield, or based on CWE mass failure observations and estimate of sediment yield.
- *Canyon wall mass failure in Lower West Branch main stem*: based on observations and measurements during the streambank erosion survey of 2000, and from aerial photographs.
- *Agricultural land*: Revised Universal Soil Loss Equation (RUSLE).
- *Streambank erosion*: data from bank erosion survey in 2000, converted to estimate of lateral recession rate by analysis from National Resources Conservation Service.
- *Residential storm water*: calculation methods followed Minnesota Pollution Control Agency (1989).

Forested Acres

From total acreage of each watershed analyzed, acreage was subtracted for land developed as hay cropping and grazing, and the total road prism network. Surface area for roads was determined by GIS road length times width estimates of various road categories (road prism width of cut slope, ditches, road surface, and fill slope). The remaining forested acreage was then given the same landtype sediment yield coefficients as natural background. Again, the calculations assume 100% delivery to streams.

Within the forested acreage are activities related to timber harvesting. Activities with a potential to increase hillslope erosion over background include: excavated skid trails and landings, tractor and cable yarding, soil compaction by heavy machinery, Cat scarification for site preparation on steep slopes, high intensity burns continuous over a large area, and damage by off-road vehicles after access afforded by canopy opening.

Experience and forest practice audits have indicated that if timber harvesting follows the rules of the Idaho Forest Practices Act, or Washington Forest Practices, that forest activities do not generally result in widespread increased surface erosion (Washington Forest Practices Board

1995). One exception in the Priest River Subbasin would be tractor-excavated skid trails where the tractor blade removes the volcanic ash cap. The WATSED model incorporates a high sediment yield for a newly excavated skid trail, and the model scales down the yield for five years at which time the skid trail is assumed healed to background levels (Niehoff *pers comm*). In recent years, the USFS in their timber sale contracts have required a reduction in deep excavated skid trails.

Sediment calculation for forested acreage in Priest River Subbasin TMDLs does not take into account the above mentioned forest activities. Thus, there is an underestimation, particularly for Non-industrial Private Timber harvests which through personal observations in the basin, will at times have inadequate BMPs. IDL - CWE inventories did examine numerous skid trails and, overall, skid trail sediment scores were rated as "low." The acknowledged underestimation is in part offset by including the entire road network in sediment yield calculations, as explained below. The problem of developing a reasonable estimate of a sediment yield coefficient for forest activities is that the degree of hillslope erosion is extremely site specific. Also, there is an incomplete inventory of features such as tractor excavated skid trails, particularly on private land. An attempt at developing sediment yield estimates would take considerable in-the-field assessments, which was not available for the TMDLs. These in-the-field assessments should be incorporated into TMDL Implementation Plans to assure appropriate priorities for sediment reduction efforts.

Unpaved Road Surface Sediment

Forest road fine sediment loading was estimated using a relationship between CWE scores and sediment delivered per mile of road (Figure A3), developed for roads on a Kaniksu granitic geology in the LeClerc Creek (Washington) watershed (McGreer *et al.* 1997). Its application to roads on Belt geology likely overestimates sediment yields from these systems. However, as described later, sediment loading developed from Priest River Subbasin CWE scores may be representing an underestimation. It is important to emphasize that the CWE score given by IDL survey crews incorporates a stream delivery multiplier. The equation of Figure A3 predicts delivered road sediment to streams in tons/mile/yr. Other methods first predict sediment yield followed by various estimates of delivery.

Unpaved road sediment calculations are done initially at each stream crossing, including closed roads but excluding obliterated roads where known. For stream crossings where there was a corresponding recorded IDL - CWE score, that score was converted to tons/mile/yr by the CWE equation. This value was reduced by the fraction of 400 ft/5,280 ft, with stream crossing load calculated as 200 ft on each side of a crossing (Harvey 2000a). Again, this value is 100% delivered to streams. For stream crossings without a CWE score, the calculations used the average CWE score at crossings that were rated within each watershed.

There are other road sediment calculation methods that suggest an underestimation of load using the CWE method. A high end CWE score at stream crossings for watersheds assessed in the Priest River Subbasin was CWE = 28 (which is the high end of a "low" road sediment score). This equates to 9.0 tons/mile/yr, or 0.7 tons/400 ft crossing/yr. The WATSED model uses a road surface erosion of 20,000 tons/mi^2/yr for a road 5 years or older after initial construction on weathered granitics (Niehoff *pers comm*). Using a 40 ft width typical for an active timber road

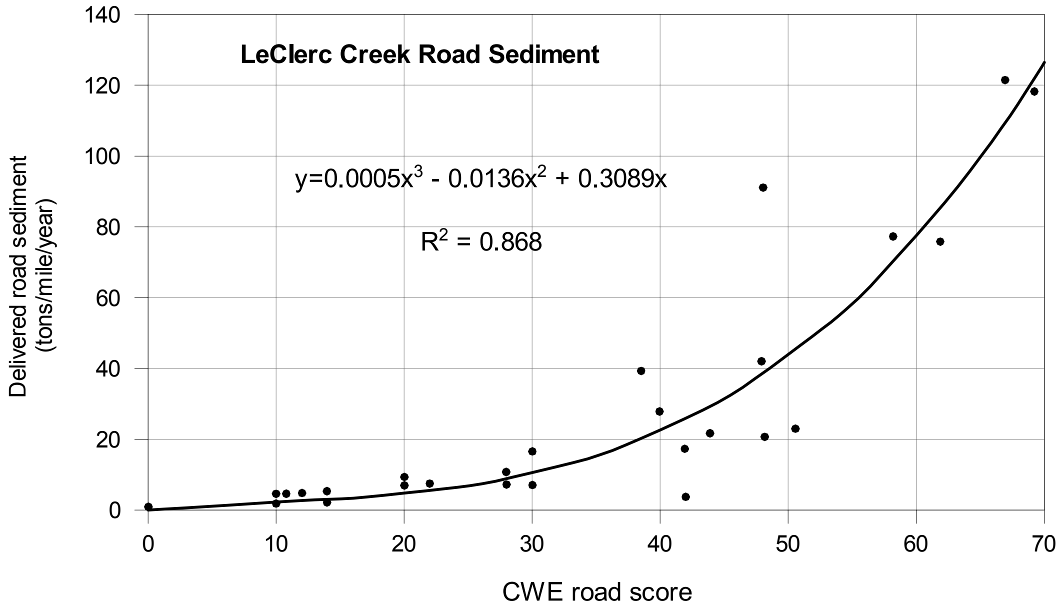

Figure A3. Sediment export of roads based on Cumulative Watershed Effects scores in the LeClerc Creek watershed, Washington (McGreer *et al*. 1997).

prism (10 ft wide cut slope, 2 ft wide ditch, 14 ft wide road tread, and 14 ft wide fill slope), the yield per 400 ft stream crossing equals 11 tons/yr. Even using a low estimate of 25% delivery to streams within 200 ft on each side of a crossing, this value is 3 - 4 times higher than the delivery at CWE score = 28.

Another example comes through a worksheet presented in the Washington Forest Practices Board Manual (WFPB 1995). With road statistics of: a road older than 2 years built on course to fined-grained granite, 30% vegetative cover on cut and fill slopes, a 2" - 6" deep gravel surfacing, and moderate active secondary traffic along with 32 inches annual precipitation, the worksheet produces 8 tons/yr at a 400 ft stream crossing. Again, assuming only 25% delivery, the yield from this example is twice the delivery of CWE score = 28.

Besides sediment delivery to streams from the road prism at stream crossings, there is delivery from roads that are in close proximity to streams. There may be significant delivery from roads that are built on steep hillslopes above and parallel to streams where culvert discharges essentially create 1st order channels down to streams without an opportunity for sediment to be trapped or settle on the forest floor. Sediment may also be delivered from roads built within the flat floodplains of a stream.

The Washington Forest Practices Board Manual (WFPB 1995) considers that roads outside of a 200 ft buffer zone from stream channels are assumed to have inconsequential sediment supply to streams because of low probability of delivery. In a study of roads constructed in coarse-grained granitic materials, equations were developed to predict downslope sediment travel distance below road fills, rock drains, and culverts (Megahan and Ketcheson 1996). Factors influencing the degree of road sediment supply to streams included: hillslope gradient, drainage design of the road, erosion volume, forest floor obstructions such as downed and embedded logs, and extent of riparian buffers along the stream coarse. An attempt at developing sediment yield estimates for roads within a 200 ft buffer using methods such as presented in the WFPB manual would take considerable in-the-field assessments, which was not available for Priest River Subbasin TMDLs.

In the GIS analysis of Priest River Subbasin §303(d) watersheds, the mileage of roads within a 200 ft buffer on each side of streams was calculated. However, because of the underestimation of not incorporating timber harvest activities in the forested acreage sediment loading, and an apparent underestimation of CWE load at stream crossings, Priest River Subbasin TMDLs use sediment load from the entire road network. The weighted mean CWE score for all roads inventoried in a watershed was applied to total miles of active unpaved roads (excluding road segments accounted for at stream crossings). CWE scores at road crossings were often greater then the weighted mean for the total road system. This would be expected given the CWE delivery multiplier. For closed and abandoned roads, the minimum CWE score of 10 was applied to total mileage of these roads. The vast majority of CWE inventories were on active forest roads in public land, and it is believed that in general, the single greatest factor affecting generation of fine sediment from road surfaces is the amount of traffic (WFPB 1995). For the Lower West Branch calculations, the weighted mean CWE score was adjusted upwards for application to the private unpaved road mileage based on observations of erosion problems and inadequacy of road BMPs.

Road System Failures

Based on USFS maintenance experiences over the past twelve years, road failures at stream crossings within western watersheds have been rare (Janecek Cobb *pers comm*). Instead, problems arise at the inlet end of culverts when they become plugged with debris. Culvert plugging causes ditch water to overwash onto the road creating gulleys and rills as the wash goes down gradient, and then down onto the fill. Sediment delivery caused by a plugged or damaged culvert was estimated at an average 10 cubic yards per event. An average number of plugged culvert events per year for each western watershed was assigned based on the USFS maintenance experiences. To obtain sediment weight/yr, volume per event was multiplied by a density of 2.16 tons/yrd^3 (1.5 gr/cc, a silt-loam density recommended by USFS as an average representation of Priest River Subbasin soils). Delivery to streams was assumed at 100%.

For watersheds where USFS maintenance experiences and failure estimates were not available, failures at stream crossings were based on IDL - CWE recorded observations of Significant Management Problems and mass failures at crossings. CWE observations include estimates of sediment volume delivered to a stream. CWE inventories only cover a portion of the road network in a watershed. For the East River watershed, CWE recorded failures at crossings were prorated to the entire road network.

To account for road prism failures other than at stream crossings, USFS maintenance experiences were again used. An average typical failure was figured as 30 ft wide by 40 ft long by 5 ft deep and 25% delivery to a stream. This calculates to 56 yrd^3. Average number of failures per year were given for the western watersheds, and volume was multiplied by 2.16 tons/yrd^3. For watersheds where USFS maintenance experiences and failure estimates were not available, yearly loading from failures were strictly based on IDL - CWE recorded observations and estimates of cubic yards delivered to streams. CWE recorded road prism failures were not prorated to the entire road network because of the uncertainty of the age of each failure (i.e.

5 observed failures does not necessarily equate to 5 failures/yr), and prorated failures gave unrealistic numbers based on maintenance experiences.

There are occasional atypical large mass failures from the road system, often associated with high runoff years (such as in the spring of 1997). A few examples include: a failure on Bear Paw Road in 1997 near the Ole Creek crossing (Lower West Branch watershed), where an estimated 8,890 yrd^3 slumped and about 25% of that volume was near the immediate vicinity of the crossing; a failure in Lamb Creek of an estimated 1,670 yrd^3 with 40% delivery to the stream; and in the Granite Creek watershed, a 1997 landslide above Athol Creek of an estimated 2,445 yrd^3, washing out portions of 3 roads with an estimated 50% delivery to Athol Creek. Sediment loading for atypical large mass failures along roads, with an average occurrence of one per ten years, was assigned within the Lower West Branch TMDL.

<u>Agricultural Land Sediment Yield</u>

Sediment yield was estimated for lands with hay and alfalfa crops, and grazing, where it is assumed that there is periodic vegetation improvement by tilling and reseeding. Sediment yield was estimated using the Revised Universal Soil Loss Equation (RUSLE, Renard *et al*. 1991). Streambank erosion, gully erosion, or scour is not taken into account by RUSLE. The range of coefficients that were used in RUSLE, as listed in the equation description below, were selected with the aid of the Idaho Soil Conservation Commission (Hogen *pers comm*).

RUSLE is: $A = (R)(K)(LS)(C)(P)$

A= average annual soil loss from sheet and rill erosion caused by rainfall and associated overland flow in tons/acre/year.

R= Erosivity Factor. NEZPERCE Req is recommended for northern Idaho, and was used in this analysis, where Req=140 which aligns with 24-25 inch precipitation.

K= Soil Erodibility Factor. This is a measure of the susceptibility of soil particle detachment by water. A value of K = 0.49 representing Bonner soil was used for Kalispell Creek, Lamb Creek, and main stem East River; and K = 0.45 for Lower West Branch as an estimate for a mixture of Selle and Mission soils which seem typical of the Lacustrine Plains landtype.

LS= Slope Length/Slope Steepness Factor. An LS factor of 0.32 was consistently assigned based on a maximum 550 ft slope length and an average 2% slope for crop land in the western watersheds.

C= Cover-Management Factor. This represents the effects of plants, soil cover, soil biomass, and soil disturbing activities on erosion. A consistent value of C = 0.002 was used based on a ten-year pasture/hay rotation and intense harvesting/grazing for worst case scenario.

P= Support Practices Factor. These practices may include contouring, strip cropping, and terraces. A value of P = 1 was consistently used indicating no support practices in place.

For most RUSLE calculations in the basin watersheds, sediment yield was around 0.04 tons/acre/year.

Encroaching Roads and Streambank Erosion

Sediment yield calculations in the Coeur d'Alene Basin have taken into account the effect of encroaching roads (roads within 50 ft of a stream) on erosion at either the road bed, or within the streambanks and streambed (Harvey 2000a). The effect of an encroaching road is that it can interfere with the stream's natural tendency to seek a steady state gradient. During high discharge periods, the constrained stream may erode at the road bed or fillslope, or if the road is sufficiently armored, the confined stream energy may erode the streambanks and the streambed. As explored in Section 3 of the *Priest River SBA and TMDL* (Rothrock 2001), the only appreciable length of encroaching forest road (excluding stream crossings) within the TMDL determined watersheds, is a 0.9 mile stretch of Forest Road 308 along a low gradient middle reach of Kalispell Creek. Since the streambank erosion survey (see below) included a portion of Kalispell Creek adjacent to the encroaching road, it seems preferable to include the encroaching road effect as part of the streambank erosion results obtained in the survey.

Under a Memorandum of Understanding between DEQ, the Kootenai-Shoshone Soil Conservation District, Idaho Soil Conservation Commission, and USDA Natural Resources Conservation Service (NRCS), a trained summer crew conducted streambank erosion surveys within many watersheds of the Coeur d'Alene and Priest River basins during the summer of 2000. The crew used a GPS unit to map location of the subsample stream segments surveyed. Streambank condition scores and measurements were stored in a GPS data dictionary. Soil samples were also obtained for laboratory analysis. Length of stream reaches surveyed ranged from 0.3 - 1.7 miles, and average reach length was around 1 mile. The Lower Priest River survey reaches were around 5 miles each. Most streams surveyed had two inventories, within a lower and middle reach. Within the Priest River Subbasin, all surveys were within gradual gradient segments, less than 1.5% slope. Often, the surveys were through adjacent hay crop and grazing lands, but many reaches were through forested land.

The NRCS methodology of analyzing the data and producing a streambank erosion sediment yield in tons/stream mile/year relies on the survey measurements of: 1) eroding bank length and eroding bank height, 2) six bank condition factors that are scored and compiled into a single index leading to an estimate of lateral recession rate (LRR) in feet/yr, and 3) soil type and soil particle size. Standard methodology and parameters measured that have been developed by NRCS were modified for conditions specific to northern Idaho (Sampson *pers comm*).

A stream section with evidence of a current eroding condition is rated as having either one bank or both as eroding. Within the eroding bank length, the six bank condition factors that are evaluated and scored are:

Bank condition and degree of bank erosion evident
Bank stability
Vegetation cover on banks
Bank and channel shape and stability
Channel bottom characteristics
Deposition of sediment from banks to channel

Maximum cumulative score of the six bank condition factors is 15. Cumulative scores from 8+ are considered severe to very severe bank erosion with an associated LRR of 0.3+ ft/yr. Stream or river lengths with both banks in a good, stable condition without signs of erosion, are considered as having zero sediment yield.

A preliminary data analysis by NRCS was made available for the Priest River Subbasin TMDL analysis (Sampson *pers comm*). The average erosion rate within stream segments surveyed ranged from 15 - 193 tons/mi/yr. For Lower Priest River the erosion rate was 475 tons/mi/yr. The assigned error rate is high, a confidence interval of 60%. The erosion rates from surveyed segments were extrapolated to adjacent low gradient reaches as long as the difference in slope between surveyed segment and unsurvyed reach was not greater than 1%. Low gradient B channel sections that are within the valley depositional reaches were included. Streambank erosion yields reflect estimates for low gradient main stem reaches only, and do not include any estimates for feeding tributaries. In addition, there has been no attempt to include bank erosion within the natural or background sediment load estimates. While estimated erosion rates are presented in tons/mile/year, the rates supplied are meant to represent long-term (20 year+) averages since erosion at a single site may come in one or two above normal flow events over that long-term average (Sampson *pers comm*).

Streambank eroding condition may be reflecting a combination of several factors, including: the effect of encroaching roads, hydrologic disequilibrium in part due to accelerated peak flow, stream channel aggradation by sediment buildup and subsequent channel widening, loss of vegetation stability due to historic riparian harvest of conifers, constriction and then increase of stream energy at improperly sized culverts and bridges, and streambank damage and loss of riparian vegetation by grazing cattle and horses. It is mostly very difficult to partition out these causes except in a few places where local effects such as undersized crossings or cattle access has clearly resulted in damage.

Residential Storm Water Runoff

The were only a few cases where sediment laden storm water runoff from a residential/ commercial area was taken into consideration for TMDL calculations (i.e., lower Lamb Creek and lower-most Reeder Creek). The lower 4 miles of Lamb Creek winds through a rural residential/commercial zone where there is some agricultural activity and surrounding forest. Within the residential/commercial zone there is ever increasing semi-impervious and impervious area of unpaved roads, parking lots, driveways, subdivisions, and residential/commercial buildings. There are new excavations each spring through fall (including a nine-hole addition to the golf course), and there have been some observations of clearing riparian vegetation down to the streambanks. The Lamb Creek residential area is mostly flat terrain with permeable soils which mitigates some of the effect of storm water runoff. For Reeder Creek, the entrance road, driveway, and parking area at Elkins Resort is a known contributor of sediment laden storm water runoff both to the mouth of Reeder Creek and Priest Lake.

An estimate of fine sediment loading from storm water runoff of residential areas was made using methods from the Minnesota Pollution Control Agency (1989). The calculation method is in part based on: annual precipitation, a runoff coefficient based on estimated impervious and semi-impervious area, and an increase of Total Suspended Sediment attributed to an area as measured or estimated upstream and downstream of the area.

Appendix B. Unit Conversion Chart

Table B1. Metric - English unit conversions.

	English Units	Metric Units	To Convert	Example
Distance	Miles (mi)	Kilometers (km)	1 mi = 1.61 km 1 km = 0.62 mi	3 mi = 4.83 km 3 km = 1.86 mi
Length	Inches (in) Feet (ft)	Centimeters (cm) Meters (m)	1 in = 2.54 cm 1 cm = 0.39 in 1 ft = 0.30 m 1 m = 3.28 ft	3 in = 7.62 cm 3 cm = 1.18 in 3 ft = 0.91 m 3 m = 9.84 ft
Area	Acres (ac) Square Feet (ft^2) Square Miles (mi^2)	Hectares (ha) Square Meters (m^2) Square Kilometers (km^2)	1 ac = 0.40 ha 1 ha = 2.47 ac 1 ft^2 = 0.09 m^2 1 m^2 = 10.76 ft^2 1 mi^2 = 2.59 km^2 1 km^2 = 0.39 mi^2	3 ac = 1.20 ha 3 ha = 7.41 ac 3 ft^2 = 0.28 m^2 3 m^2 = 32.29 ft^2 3 mi^2 = 7.77 km^2 3 km^2 = 1.16 mi^2
Volume	Gallons (g) Cubic Feet (ft^3)	Liters (l) Cubic Meters (m^3)	1 g = 3.78 l 1 l = 0.26 g 1 ft^3 = 0.03 m^3 1 m^3 = 35.32 ft^3	3 g = 11.35 l 3 l = 0.79 g 3 ft^3 = 0.09 m^3 3 m^3 = 105.94 ft^3
Flow Rate	Cubic Feet per Second (ft^3/sec)[1]	Cubic Meters per Second (m^3/sec)	1 ft^3/sec = 0.03 m^3/sec 1 m^3/sec = ft^3/sec	3 ft^3/sec = 0.09 m^3/sec 3 m^3/sec = 105.94 ft^3/sec
Concentration	Parts per Million (ppm)	Milligrams per Liter (mg/l)	1 ppm = 1 mg/l[2]	3 ppm = 3 mg/l
Weight	Pounds (lbs)	Kilograms (kg)	1 lb = 0.45 kg 1 kg = 2.20 lbs	3 lb = 1.36 kg 3 kg = 6.61 kg
Temperature	Fahrenheit (°F)	Celsius (°C)	°C = 0.55 (F - 32) °F = (C x 1.8) + 32	3 °F = -15.95 °C 3 ° C = 37.4 °F

[1] 1 ft^3/sec = 0.65 million gallons per day; 1 million gallons per day is equal to 1.55 ft^3/sec.
[2] The ratio of 1 ppm = 1 mg/l is approximate and is only accurate for water.

Appendix C. Distribution List

Panhandle Basin Advisory Group (BAG - 10 members)

Priest Lake Watershed Advisory Group (WAG - 15 members including USFS, IDL, IDFG, Selkirk Conservation Alliance, Bonner County Commissioner, and representatives from local Industrial Timber, Agriculture, and Chamber of Commerce).

Department of Environmental Quality, Boise – Technical Review.

Environmental Protection Agency – EPA staff assigned to review Priest River Subbasin TMDLs.

Alliance for the Wild Rockies

Kalispel Tribe of Indians.

Kootenai Environmental Alliance.

Appendix D. Public Comment

The draft *Addendum* report was published in September 2002 with document distribution as shown in Appendix C. There was an advertised public comment period from October 7 through November 8, with the Notice of Request shown below listed in four newspapers: Priest River Times, Gem State Miner, Bonner County Daily Bee, and Spokesman Review. There was also a discussion of comments received and a public forum for further comments at a December 5th meeting of the Panhandle Basin Advisory Group (BAG).

Four comment packages were received and these were from: EPA, Kootenai Environmental Alliance, Alliance for the Wild Rockies, and IDL, along with a review by the DEQ Technical Services unit in Boise. Each comment letter followed by a DEQ response to comments are listed in Appendix D.

Based on comments to the draft *Addendum*, two major changes were made to the draft document. Because of changes in recommendations regarding the §303(d) list along with inclusion of two sediment TMDLs not presented in the original draft, DEQ decided to provide another 30 day public comment period for review of a revised draft (February 5 to March 7, 2003). One comment of significance was received, a letter from Stimson Lumber Company.

Notice of Request for Public Comment

The Idaho Department of Environmental Quality (DEQ) is seeking public comment on total maximum daily loads (TMDLs) and changes to Idaho's 303(d) list for the Priest River Subbasin. The TMDLs address water quality problems for waters on the 303(d) list and are designed to bring the waters into compliance with state and federal water quality standards.

Specifically, the draft TMDLs establish a sediment allocation for Reeder Creek and East River. There is also a draft water temperature TMDL and temperature allocation for East River. DEQ is also proposing that Binarch Creek be removed from Idaho's 303(d) list, and that sediment be removed as a pollutant of concern from the 303(d) listing of Lower Priest River.

The draft TMDLs and de-listings will be discussed at the December 5, 2002 Panhandle Basin Advisory Group (BAG) meeting to be held at the Idaho Department of Fish and Game, 2750 Kathleen Ave., Coeur d'Alene, Idaho. BAG meetings are open to the public.

Copies of the draft document *Addendum – Priest River Subbasin Assessment and TMDL*, which presents the proposed TMDLs and de-listings, will be available for review, Monday, October 7, 2002, through Friday, November 8, 2002, at DEQ's Coeur d'Alene Regional Office, the Priest River Library, and on DEQ's web page: www.deq.state.id.us. Written comments may be submitted through November 8, 2002, to:

Glen Rothrock
DEQ Coeur d'Alene Regional Office
2110 Ironwood Parkway, Suite 100
Coeur d'Alene, ID 83814
(208) 769-1422
Email: grothroc@deq.state.id.us

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

November 15, 2002

Reply To
Attn Of: OW-134

Mr. Glen Rothrock
DEQ Coeur d'Alene Regional Office
2110 Ironwood Parkway
Coeur d'Alene, ID 83814-2648

Dear Mr. Rothrock:

Thank you for the opportunity to review the draft Addendum Priest River Subbasin Assessment (SBA) and Total Maximum Daily Load (TMDL) that was released for public comment on October 7, 2002. Following are the U.S. Environmental Protection Agency (EPA) comments on this draft Addendum SBA and TMDL.

This draft document presents the SBA for portions of the Priest River Subbasin that required further data collection and analysis then was contained in the October 2001 submittal to EPA. This document also contains the Reeder Creek sediment TMDL, the East River sediment TMDL, and the East River temperature TMDL. EPA would like to acknowledge the significant effort that went into developing this SBA and TMDL. The following comments provide some suggestions on changes to help clarify the SBA and TMDLs.

Executive Summary

Page 5, Table B. Summary of Subbasin Assessment Outcomes

This table is helpful in understanding the outcomes of the SBA and the justifications for why a TMDL has not developed at this time or why a de-listing recommendation has been made. However, the appropriate avenue for de-listing is for DEQ to remove this water from the 303(d) list during the 2002 list process, following appropriate public notice and opportunity for comment, and present information to support their proposal. If EPA approves the removal of this water from the 303(d) list, Idaho would not be required to develop a TMDL for it. When evaluating whether to remove this water from the 2002 303(d) list, DEQ must assemble and evaluate all existing and readily available water quality-related data and information.

Key Findings

The Key Findings section (pgs. 4-13) gives a comprehensive overview of the waterbodies addressed in this document. The recommendations were extremely well presented and clearly articulated. DEQ is encouraged to present this information with the 2002 303(d) list to explain the reasons for listing and de-listing the waters covered in this SBA.

Binarch Creek

Page 36, Water Column Data

Given the "unusually diverse assemblage of aquatic plants and animals" in Binarch Creek, it seems that water quality and bacteria samples as well as pH or DO measurements should be taken to better evaluate this system.

Pages 40-41, Status of Beneficial Uses

It is stated that sediment loads for the Binarch Creek watershed are low to moderate on a basin wide comparison and it is being recommended that Binarch Creek be removed from the 303(d) list for sediment. However, the two mid-lower WBAG II Sites have an average CR that fails and the mid and upper sites have no data available for SMI and SHI. It is also stated on page 35 that two of the BURP sites were located within beaver complexes that were "sediment laden environments."

Please provide more information regarding the status of beneficial uses in Binarch Creek, because the information currently presented does not fully support the recommendation for sediment de-listing.

East River Main Stem for Sediment, and East River System for Dissolved Oxygen

Page 48, Status of Beneficial Uses

EPA agrees with the recommendation calling for the collection of bacteria data, given the primary contact recreation use status.

Lower Priest River

Pages 55-67

The Lower Priest River is currently listed for sediment, yet in the SBA there is little discussion about sediment except for the following. On page 58, it is stated that hay cropping and some cattle grazing is occurring along the river, as is some small-scale timber operations. Observations from the river bank surveys show that there are several segments of raw banks with signs of recent erosion and chucks of upper bank broken off and slumped into the high water zone. It is also suggested that in a couple of cases the bank slumping was associated with fill slopes of adjacent roads.

On page 67, it is recommended that the Lower Priest River be de-listed for sediment, but there is very little information presented in the SBA to support or counter this recommendation. Please provide more information regarding the status of beneficial uses in the Lower Priest River, because the information currently presented does not fully support the recommendation for sediment de-listing.

Sediment TMDL for Reeder Creek

Pages 73-82

Page 73, Target Selection

Based upon the information presented on pages 172-175 in the October 2001 Priest River SBA and TMDL, EPA agrees with the analysis that supports the loading capacity being set at 50% above background for the listed waters of the Priest River watershed.

Page 75, Table 17

Table 17 is a little confusing in that it is hard to conclude that the Natural Sediment Load calculated in the top portion of the table is also included in the Current Sediment Load portion of the table. Perhaps a note could be included at the bottom of the table that could direct the reader to the section of the TMDL that describes how the natural sediment load was included in the current sediment load.

Page 78, Table 18

The Sediment Allocation column in Table 18 should say "Includes Natural Background" to help clarify that this amount is not in addition to natural background.

Page 80, Table 19

It is a very disturbing precedent to allow a land ownership/management group to discharge additional sediment into a system that is requiring a sediment reduction of 120 tons/year, as is the case for the Industrial Timberlands. In the paragraph directly below this table, it is stated that there is a two-mile stretch of Forest Service road that accesses Stimson timberland which currently has sediment yield problems. It is suggested that the USFS and Stimson need to work together to correct this problem, but given that Industrial Timber Lands can actually discharge 13 additional tons/year of sediment, what incentive would Stimson have to fix this problem? It would seem to make more sense to give the Industrial Timberlands an allocation that equals their current sediment load, holding any additional load in reserve. The reserve could be used for future potential. Another option would be to incorporate this 13 tons/year into a greater margin of safety that could allow the system to meet reductions more quickly.

East River Sediment TMDL

Pages 83-95

Pages 86-87, Tables 20 and 21

Similar to Table 17, Tables 20 and 21 are a little confusing in that it is hard to conclude that the Natural Sediment Load calculated in the top portion of the table is also included in the Current

Sediment Load portion of the table. Perhaps a note could be included at the bottom of the table that could direct the reader to the section of the TMDL that describes how the natural sediment load was included in the current sediment load.

Page 91, Table 22

The Sediment Allocation column in Table 22 should say "Includes Natural Background" to help clarify that this amount is not in addition to natural background.

East River Temperature TMDL

Pages 96-113

Page 98, Target Selection

For clarity, please include a map that shows the location of the reference site in relation to East River.

EPA appreciates the opportunity to comment on the draft Addendum Priest River Subbasin Assessment (SBA) and TMDL and looks forward to the final submission. If you have any questions regarding the comments on the draft TMDL, please contact me at 206-553-6326.

Sincerely,

Tracy Chellis
TMDL Project Manager

January 24, 2003

Tracy Chellis
TMDL Project Manager
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, WA 98101

Dear Tracy:

Thank you for providing comments on the draft report, *Addendum – Priest River Subbasin Assessment and Total Maximum Daily Load*. Four letters of comment were received by the end of the extended public comment period. The comments received resulted in two major changes to the draft *Addendum* as incorporated in a revised draft document (enclosed): 1) sediment was retained as a pollutant of concern for the Binarch Creek §303(d) listing, and a sediment TMDL was prepared (pages 89-96), and 2) sediment was retained as a pollutant of concern for the Lower Priest River §303(d) listing, and a sediment TMDL was prepared (pages 125-136). There will be an additional public comment period for this revised draft. If your organization has any further comments, please supply them to me by March 7, 2003.

The comments as we understood them from EPA are listed below, followed by DEQ's response. If a revision was made to the draft *Addendum* report, this is noted. All comment letters received and DEQ's response letters are included in Appendix D of the revised draft subbasin assessment and TMDL document.

Comment 1. Table B lists stream segments recommended for 303(d) de-listing. However, the appropriate avenue for de-listing is for DEQ to remove this water from the 303(d) list during the 2002 list process, following appropriate public notice and opportunity for comment.

Response 1. DEQ is aware of the procedure for §303(d) de-listing. The draft 2002 DEQ §303(d) list will be available in early 2003 for public comment. Stream segments removed from the §303(d) list from the Priest River Subbasin will have the backing of subbasin assessments that evaluate all existing and readily available water-quality related data and information.

Comment 2. EPA suggests that given the "unusually diverse assemblage of aquatic plants and animals" in Binarch Creek, it would seem that water quality and bacteria samples as well as pH or DO measurements should be taken to evaluate this system.

Response 2. This suggestion will passed on to the US Forest Service as part of their stream evaluation within the Research Natural Area. At this point in time, DEQ has completed its reconnaissance monitoring for beneficial use support in Binarch Creek.

Comment 3. In reference to the recommended removal of Binarch Creek from the 303(d) list, EPA cites from the *Addendum* that "the two mid-lower WBAG II sites have an average CR that fails and the mid and upper sites have no data available for SMI and SHI. It is also stated on page 35 that two of the BURP sites were located within beaver complexes that were sediment laden environments." EPA's comment is to provide more information regarding the status of beneficial uses in Binarch Creek, because the information currently presented does not fully support the recommendation for sediment de-listing.

Response 3. There are no additional water-quality related sources of information for Binarch Creek outside that presented in the subbasin assessment. As stated in the introduction of this letter, the final report retains Binarch Creek on the §303(d) list and a sediment TMDL has been prepared.

Comment 4. In reference to the recommended removal of sediment from the Lower Priest River 303(d) listing, EPA states that there is very little discussion about sediment except for some references on page 58. EPA comments that there is very little information presented in the SBA to support or counter the recommendation of sediment de-listing. EPA requests that DEQ provide more information regarding the status of beneficial uses in the Lower Priest River, because the information currently presented does not fully support the recommendation for sediment de-listing.

Response 4. The *Addendum* section on Lower Priest River refers the reader to additional land use and sediment source information presented in the initial *Priest River Subbasin Assessment and TMDL* (published October 2001). The *Addendum* report also refers the reader to report sections of Lower West Branch Priest River and East River, two major watersheds draining into Lower Priest River which both had comprehensive sediment source information presented, as well as sediment TMDLs.

There are no additional water-quality related sources of information for Lower Priest River outside that presented in the subbasin assessment. As stated in the introduction of this letter, the final report retains sediment as a pollutant of concern on the Lower Priest River §303(d) listing, and a sediment TMDL has been prepared.

Comment 5. Tables 17, 20, and 21 are a little confusing in that it is hard to conclude that the Natural Sediment Load calculated in the top portion of the table is also included in the Current Sediment load portion of the table.

Response 5. These tables have been modified for clarity.

Comment 6. This EPA comment refers to Table 19, Reeder Creek TMDL, in which the calculated current sediment load from Industrial Timber lands is 12 tons/year less than the sediment allocation (1.5 times natural background load). EPA states their concern of setting a precedent to allow land ownership/management groups to discharge additional sediment into a system which requires a sediment reduction TMDL. EPA offers a solution of giving the Industrial Timber lands an allocation that equals their current load.

Response 6. The reason that Industrial Timber lands received a calculated –12 tons/year sediment reduction is that within the 0.9 mi^2 of these private lands, there are no documented roads, and thus no sources of current sediment load (current = background). The TMDL calculations were modified to give Industrial Timber lands a sediment allocation of 25 tons/year, equal to the calculated current sediment load. This assigns a “no net sediment increase” to future land use activities on these private lands. The gain in sediment load reduction of 12 tons/year was explained and is held in reserve.

Sincerely,

Glen Rothrock
DEQ Watershed Coordinator

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DEQ-Coeur d'Alene
Regional Office

Kootenai Environmental Alliance

November 6, 2002

Glen Rothrock, DEQ Watershed Coordinator
Department of Environmental Quality
2110 Ironwood Parkway,
Coeur d'Alene, ID 83814-2648

Dear Mr. Rothrock:

The following comments are submitted on behalf of the Kootenai Environmental Alliance on the draft report, *Addendum-Priest River Subbasin Assessment and Total Maximum Daily Load.* The report recommends that Binarch Creek and Lower Priest River be removed from 303(d) list and that sediment is no longer the pollutant of concern in these waters. We believe that these streams should not be de-listed.

A. Binarch Creek:

The analysis on pages eight and 41 of the draft indicate DEQ and USFS electro-fishing results show a dominance of westslope cutthroat trout except near the mouth of the Creek. The final report for Binarch Creek should include information that would indicate whether the populations of cutthroat trout in the watershed are increasing or decreasing.

The analysis on pages eight and 41 also indicate sediment load calculations in the watershed are low. The analysis on page 40 described a 1998 USFS habitat survey over much of the Creek. The following statement is included in the analysis on page 40. "Where gravel substrate was discovered in B3, B4, and E4 channel types (including pool tailouts), measured fines in these channel types tended to be high, greater than 50% of 1 - 8 mm size grains."

The final report should indicate whether the sediment calculations performed in the watershed include areas where the B3, B4, and E4 channel types were located. The final report should also indicate whether the estimated (not measured) peak flows of 55 to 60 cfs in the watershed could result in channel instability and negatively impact streambeds and fisheries habitat in any sections of Binarch Creek.

The following is an excerpt from a February 13, 2001 letter from Barry Rosenberg to Glen Rothrock regarding the status of Binarch Creek. We have included it in this letter because we believe that these concerns have not been adequately addressed in the *Addendum Priest River Subbasin Assessment and Total Maximum Daily Load*, September 2002.

> "Binarch Creek should not be de-listed. According to the IPNF WATSED model it is experiencing very high peak flows of 15% over

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natural. The Douglas fir Beetle timber sale (DFB) will increase these flows to 17% according to WATSED. The Project files for the DFB Project describes Binarch Creek and the amount of logging that has occurred in the last 25 years.

> With the exception of reach 1, the B channel type reaches [Binarch Creek] have extremely poor pool habitat due to the aggradation of sediment." Project files P-FI_9
>
> The Binarch Creek drainage is a complicated drainage that has a Forest Service Designated Research Natural Area (RNA) in the top 1/3 of the drainage and also has had considerable harvesting in the last 25 years over the other 2/3 of the drainage (the majority of the harvesting was regeneration harvesting)." Project files P-WA_4

The DFB Project proposes to obliterate only 0.5 mile of road out of the 50.4 miles of road currently in the drainage while building 1.3 miles of temporary road (0.5 on high-risk soils) and logging 496 acres. FEIS Project Files, P-WA_4. Like Lamb Creek, most of the logging is occurring in the headwater tributaries.

Most of the logging will be clearcut type regeneration logging, and also like Lamb Creek, is not limited to the removal of dead and dying Douglas fir. In fact in many of the units more live non-Douglas fir will be logged than beetle attacked Douglas fir. The impacts of this timber sale should be quantitatively assessed before this stream is considered for de-listing. It would be foolish to jeopardize a genetically pure population of westslope cutthroat trout and a chance of stream recovery by de-listing this stream."

The following is an excerpt from a February 23, 2001 letter from EPA official, Lee Woodruff to Glen Rothrock. Again, we are including this excerpt because we feel that the *Addendum* fails to adequately address Mr. Woodruff's concerns.

" **Binarch Creek**

Although there is conflicting information, it would appear that Binarch Creek does not fully support its uses, and should not be de-listed. The MBI scores within the beaver complex are admittedly difficult to interpret, but the IDEQ fish survey results in 2000 did not meet full support of salmonid spawning, and the USFS indicates that poor habitat exists in B channels due to sediment aggradation, due in part to fairly extensive timber harvest and the associated road network. On the other hand anecdotal information from the USFS suggests that brook trout and cutthroat are "self-propagating," though it is unclear whether these populations are just hanging on, or are fully supported. We recommend retaining this water on the 303(d) list and writing a sediment TMDL, or revising the TMDL schedule and collecting additional information to better assess beneficial use support status." P. 1

B. Lower Priest River:

The analysis on page 13 of the draft mentioned habitat degradation of historical tributary spawning beds of fluvial and adfluvial cutthroat trout and bull trout. The fisheries analysis on page 59 included the following sentences. "Based on electro-fishing within the Middle Fork East River, there may be a small fluvial subadult and adult bull trout population within the river. Local anglers state that on occasion a bull trout is caught. The river is considered of high importance in bull trout recovery plans (Panhandle Basin

Bull Trout TAT 1998)." On page 65 it was stated the River is a migratory corridor for adult bull trout that spawn in the East River drainage.

The final report for Lower Priest River should provide information on the quantities of sediment, fine and/or coarse, that enter the river system as a result of rain-on-snow and spring runoff events described on page 60 of the draft.

I (Barry Rosenberg) have personally witnessed consistent, extremely high levels of turbidity in the Upper West Branch and Lower West Branch of the Priest River during rain-on-snow events and spring runoff. The turbidity levels are so high in Goose Creek, a tributary to the Upper West Branch, that its consistency appears to be more like chocolate soup than water. This sediment is being deposited into the lower Priest River.

During the 2000 spring runoff I went to the confluence of the Lower West Branch and the Priest River. I witnessed a large turbid plume flowing from the Lower West Branch into the Priest River. The assessment also acknowledges that large quantities of sediment are being deposited in the lower Priest River from streambank erosion and from sediment producing activities in the drainages of the east side tributaries.

Introductions of such large quantities of sediment into the river system are likely to have resulted in cumulative degradation to fisheries habitat. Due to the importance of the River in bull trout recovery plans, and it being a bull trout migratory corridor, the effect on sediment in the River should be re-evaluated in terms of it being considered as a pollutant of concern. A more detailed study is warranted.

Thank you for your consideration of these comments.

Respectfully submitted,

Barry Rosenberg

Barry Rosenberg, Executive Director and for

B.R.

Mike Mihelich, Forest Watch Coordinator

Cc: Christine Psyk

Lee Woodruff

January 24, 2003

Barry Rosenberg, Executive Director
Kootenai Environmental Alliance
P.O. Box 1598
Coeur d'Alene, ID 83816-1598

Dear Barry:

Thank you for providing comments on the draft report, *Addendum – Priest River Subbasin Assessment and Total Maximum Daily Load*. Four letters of comment were received by the end of the extended public comment period. The comments received resulted in two major changes to the draft *Addendum* as incorporated in a revised draft document (enclosed): 1) sediment was retained as a pollutant of concern for the Binarch Creek §303(d) listing, and a sediment TMDL was prepared (pages 89-96), and 2) sediment was retained as a pollutant of concern for the Lower Priest River §303(d) listing, and a sediment TMDL was prepared (pages 125-136). There will be an additional public comment period for this revised draft. If your organization has any further comments, please supply them to me by March 7, 2003.

The comments as we understood them from the Kootenai Environmental Alliance are listed below, followed by DEQ's response. If a revision was made to the draft *Addendum* report, this is noted. All comment letters received and DEQ's response letters are included in Appendix D of the revised draft subbasin assessment and TMDL document.

Comment 1. The analysis on pages 8 and 41 for Binarch Creek indicate that DEQ and USFS electro-fishing results show a dominance of westslope cutthroat trout except near the mouth. The final report should include information that would indicate whether the populations of cutthroat trout in the watershed are increasing or decreasing.

Response 1. There are insufficient historic fish surveys to determine the population trend of cutthroat trout.

Comment 2. The analysis on pages 8 and 41 indicate the sediment load calculations in the Binarch Creek watershed are low. The analysis on page 40 described a 1998 USFS habitat survey over much of the creek. The following statement was included in the analysis, "where gravel substrate was discovered in B3, B4, and E4 channel types (including pool tailouts), measured fines in these channel type tended to be high, greater than 50% of 1 – 8 mm size grains." The final report should indicate whether the sediment calculations performed in the watershed include areas where the B3, B4, and E4 channel types were located.

Response 2. Sediment calculations included the entire road network of the Binarch Creek watershed. Analysis of measured percent fines has been changed in recent DEQ protocol (Water Body Assessment Guidance, Second Edition, 2002). Percent fines are now grain sizes ≤2 mm. Percent fines from the 1998 USFS survey are considered moderate.

Comment 3. The final report should also indicate whether the estimated (not measured) peak flows of 55 to 60 cfs in the watershed could result in channel stability and negatively impact streambeds and fisheries habitat in any sections of Binarch Creek.

Response 3. There is insufficient hydrologic analysis from the USFS to determine impact on channel stability and impact to fisheries habitat.

Comment 4. KEA cites excerpts from a letter sent to DEQ on February 13, 2001 as comment to the original *Priest River Subbasin Assessment and TMDL* (October 2001). KEA believes these comments are still relevant to the *Addendum* document because the concerns in the comments have not been adequately addressed. The comments are as follows:

a. Binarch Creek should not be de-listed. According to the IPNF WATSED model it is experiencing very high peak flows of 15% over natural. The Douglas fir Beetle (DFB) timber sale will increase these flows to 17% according to WATSED.

b. With the exception of reach 1, the B channel type reaches have extremely poor pool habitat due to the aggradation of sediment, as cited in Project files P-FI_9.

c. Outside of the Research Natural Area, the Binarch Creek drainage has had considerable timber harvesting in the last 25 years (the majority of the harvesting was regeneration harvesting), as cited in Project files P-WA_4.

d. The DFB Project proposes to obliterate only 0.5 mile of road out of the 50.4 miles of road currently in the drainage while building 1.3 miles of temporary road (0.5 miles on high-risks soils) and logging 496 acres, as cited in Project files P-WA_4.

e. Most of the DFB logging will be clearcut type regeneration logging, and not limited to the removal of dead and dying Douglas fir. The impacts of this timber sale should be quantitatively assessed before this stream is considered for de-listing. It would be foolish to jeopardize a genetically pure population of westslope cutthroat trout and a chance of stream recovery by de-listing this stream.

Response 4. After reexamining the Douglas-fir beetle EIS, the cited runoff modification was 11% over natural, but this was a table combining Lamb Creek and Binarch Creek. The 17% referred to current hydrologic openings. In regards to references made of the Douglas-fir beetle timber sales, this timber activity did not occur within the Binarch Creek watershed, and there is no current USFS effort to reissue an EIS for proposed cuts in this watershed. The current active road density is around 2.2 mi/mi^2 compared to a historic active road density of 5.9 mi/mi^2. Much of the historic network has been closed and has reestablished vegetative stability. Road 639N adjacent to the lower half of the stream has been converted to a hiking trail.

Comment 5. The KEA comment package cites excerpts from a February 23, 2001 letter from Lee Woodruff, EPA. The EPA comment letter includes reference to: MBI scores being difficult to interpret; DEQ fish surveys in 2000 did not meet full support of salmonid spawning; and USFS indicates that poor habitat exists in B channels due to sediment aggradation, due in part to fairly extensive timber harvests and the associated road network. The EPA letter concludes by recommending that Binarch Creek be retained on the 303(d) list and writing a sediment TMDL, or revising the TMDL Schedule and collecting additional information to better assess beneficial use support status.

Response 5. As stated in the introduction of this letter, the final report retains Binarch Creek on the §303(d) list and a sediment TMDL has been prepared.

Comment 6. The final report for Lower Priest River should provide information on the quantities of sediment, fine and/or course, that enter the system as a result of rain-on-snow and spring runoff events described on page 60 of the draft.

Response 6. The sediment TMDL for Lower Priest River (see response 7) shows estimated annual sediment input from the Lower West Branch watershed, the East River watershed, and from eroding riverbanks. A sediment TMDL will be developed for Upper West Branch following the listing of this stream on the 2002 DED §303(d) list.

Comment *7*. Personnel accounts are given on observed high amounts of turbidity in the Upper West Branch, Goose Creek, and Lower West Branch during rain-on-snow events and spring runoff. This sediment is being deposited into Lower Priest River. Introductions of such large quantities of sediment into the river system are likely to have resulted in cumulative degradation to fisheries habitat. Due to the importance of the river in bull trout recovery plans, and it being a bull trout migratory corridor, the effect on sediment in the river should be re-evaluated in terms of it being considered as a pollutant of concern. A more detailed study is warranted.

Response *7*. As stated in the introduction of this letter, the final report retains sediment as a pollutant of concern on the Lower Priest River §303(d) listing, and a sediment TMDL has been prepared.

Sincerely,

Glen Rothrock
DEQ Watershed Coordinator

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DEQ-Coeur d'Alene
Regional Office

November 28, 2002

Liz Sedler
Alliance for the Wild Rockies
PO Box 1203
Sandpoint, ID 83864

Glen Rothrock
DEQ Watershed Coordinator
IDEQ
2110 Ironwood Parkway
Coeur d'Alene, ID 83814

RE: Comments on the draft Addendum - Priest River Subbasin Assessment and TMDL

Dear Glen,

I am submitting these comments on the draft Addendum - Priest River Subbasin Assessment and TMDL (Addendum) on behalf of the Selkirk Conservation Alliance (SCA) and Idaho Sporting Congress (ISC) as well as the Alliance for the Wild Rockies (AWR).

We appreciate the comprehensive body of available information that you have collected in your effort to arrive at a well-informed conclusion regarding the beneficial use status of the four 303(d) listed water bodies in the Priest River Basin that were delayed for determination in the final Priest River Subbasin Assessment and TMDL, October 2001.

Unfortunately, as we have stated in previous comments regarding the WBAG protocol and its successor WBAG II, we believe that strong evidence of impairment from sources other than BURP data collection as well as BURP is not considered in determining beneficial use support status due to flaws within the protocol. Data indicating impairment is meaningful only if considered during data processing in the WBAG. The fact that aquatic habitat degradation is not a major consideration in determination of beneficial use support continues to be a problem. We contend that WBAG results are biased toward full support as a result of that and other flaws. Had habitat been a prominent consideration, as well as other major flaws in the protocol corrected, we believe that Trapper Creek, Two Mouth Creek, Tango Creek, Lamb Creek and the North and Middle Forks of the East River would have been judged to Not Fully Support their beneficial uses; degraded water quality and aquatic habitat in these streams would have been improved as a result of development and implementation of TMDLs.

Conclusions in the Addendum

The determination that Reeder Creek is not fully supporting its beneficial uses due to sediment and preparation of a TMDL are a step forward in restoring one of the many impaired streams in the Priest River Basin (PRB). The preparation of a temperature

TMDL and its implementation will likewise be a step toward restoration of native fish in the PRB.

The determination that Binarch Creek is not impaired by sediment provides an example of a stream that fell through the cracks as a result of shortcomings in the BURP/ WBAG process. Habitat, macroinvertebrates and fish were apparently not assessed above the RNA by DEQ. However the Forest Service "comprehensive habitat survey" in 1998 found that "[w]here gravel substrate was discovered in B3, B4 and E4 channel types (including pool tailouts), measured percent fines tended to be high, greater than 50% of 1-8 mm size grains." Addendum at 40. This indicates that sediment is likely a problem in the stream reaches in Binarch Creek that are outside the marshy, slow water reaches dominated by beaver activity that BURP is not designed to assess.

The Forest Service information was apparently not used in support status determination because it didn't fit the exact criteria required for incorporating "outside" data. The failure to consider hard data collected by the Forest Service, that is likely as credible as BURP data, is one of the many flaws in the WBAG protocol. The Forest Service data should be re-considered and/or BURP surveys conducted outside the marshy, undefined channel reaches to determine whether Binarch Creek deserves a sediment TMDL.

Addressing the temperature problems in Binarch Creek through eventual implementation of a temperature TMDL will be a small step toward helping this stream recover from excessive logging (43% of the drainage) and a road density (2.2 mi/sqmi of active roads plus an unknown density of inactive roads) that is likely a source of higher than natural sediment delivery to the stream.

We concur with the decision to do sediment and temperature TMDLs for the Middle Fork, North Fork and mainstem of the East River.

The de-listing of Lower Priest River for sediment relies on the IREAF (Grafe 2002) protocol which, as pointed out in the Addendum, does not include a sediment monitoring protocol. The IREAF is comprised of the RMI (river macroinvertebrate index), the RDI (river diatom index) which rely on BURP data, the RFI (river fish index) and the RPI (river physicochemical index). Addendum at 59. None of the river indexes actually measure sediment.

The Addendum describes the results of a river bank erosion survey conducted in 2000. Observations indicate that there are many obvious, major sources of sediment delivery to the Lower Priest River: "...several segments of raw banks with signs of recent erosion and even chunks of upper bank broken off and slumped into the high water zone. ...high raw banks with a thick layer of gravelly sand and silt loam... This condition is susceptible to slippage and mass failure, and failures are commonly observed along the river course. In a few cases bank slumping was associated with fill slopes of adjacent roads."

Add to these sediment sources the sediment that flows into the river from the East River and Reeder Creek, as well as other tributaries that are not listed for sediment but nonetheless add to the sediment that flows into Lower Priest River, and there can be no doubt that sedimentation in this river segment greatly exceeds historic, natural levels. The massive amount of sediment is more than likely a source of impairment to beneficial uses.

Furthermore, there is only one BURP site on 35.3 miles of river, which is hardly an adequate sampling of the data that the IREAF does collect. Fish data was collected by USGS at river mile 3.8 in the fall of 1998 and by IDFG at selected reaches from river mile 7.5 to the mouth in April, 2002. Addendum at 64. Again this is hardly a representative sampling of fish presence in the river. Lower Priest River should not be removed from consideration for a sediment TMDL until a more comprehensive survey is completed. The survey should include actual measurement of fine sediment levels in the river.

Lower Priest River once supported a thriving native cutthroat fishery which is now apparently depressed. Bull trout still use it a migratory corridor. We agree with the Addendum's conclusion that cold water aquatic life is an appropriate designated use for the Lower Priest River. Addendum at 65, 66.

Thank you for the opportunity to comment.

Sincerely,

Liz Sedler

cc: EPA

January 24, 2003

Liz Sedler
Alliance for the Wild Rockies
P.O. Box 1203
Sandpoint, ID 83864

Dear Liz:

Thank you for providing comments on the draft report, *Addendum – Priest River Subbasin Assessment and Total Maximum Daily Load*. Four letters of comment were received by the end of the extended public comment period. The comments received resulted in two major changes to the draft *Addendum* as incorporated in a revised draft document (enclosed): 1) sediment was retained as a pollutant of concern for the Binarch Creek §303(d) listing, and a sediment TMDL was prepared (pages 89-96), and 2) sediment was retained as a pollutant of concern for the Lower Priest River §303(d) listing, and a sediment TMDL was prepared (pages 125-136). There will be an additional public comment period for this revised draft. If your organization has any further comments, please supply them to me by March 7, 2003.

The comments as we understood them from the Alliance for the Wild Rockies (AWR) are listed below, followed by DEQ's response. If a revision was made to the draft *Addendum* report, this is noted. All comment letters received and DEQ's response letters are included in Appendix D of the revised draft subbasin assessment and TMDL document.

Comment 1. The Forest Service habitat survey of Binarch Creek in 1998 was referenced, citing that "where gravel substrate was discovered in B3, B4 and E4 channel types (including pool tailouts), measured percent fines tended to be high, greater than 50% of 1 – 8 mm size grains." The AWR comment states that this indicates that sediment is likely a problem in the stream reaches in Binarch Creek that are outside the marshy, slow water reaches dominated by beaver activity that BURP is not designed to assess. The AWR comments that the Forest Service information was not used in support status determination because it did not fit the exact criteria required for incorporating "outside" data, and that use of this data should be reconsidered to determine whether Binarch Creek deserves a sediment TMDL.

Response 1. As stated in the introduction of this letter, the final report retains Binarch Creek on the §303(d) list and a sediment TMDL has been prepared. Part of this decision was based on reconsidering the 1998 USFS habitat survey as indicating that sediment is a problem.

Comment 2. The de-listing of Lower Priest River for sediment relies on the IREAF protocol that does not include a sediment monitoring protocol. None of the river indexes (RMI, RDI, RFI, and RPI) actually measure sediment.

Response 2. The measurements of certain habitat parameters related to sediment used in wadable streams are not practical or even possible in medium to large size rivers. The biological indexes of RMI and RDI do include metrics that incorporate sensitivity to sedimentation.

Comment 3. The *Addendum* describes the results of a river bank erosion survey conducted in 2000 where there are many obvious, major sources of sediment delivery from the banks into Lower Priest River. Add to this sediment source the sediment that flows into the river from tributaries and there can be no doubt that sedimentation in this river segment greatly exceeds historic, natural levels.

Response 3. The final report includes erosion estimates from the 2000 bank survey that were not available in the draft report. As stated in the introduction of this letter, the final report retains sediment as a pollutant of concern on the Lower Priest River §303(d) listing, and a sediment TMDL has been prepared. This TMDL includes riverbank erosion and watershed sediment input from Lower West Branch and East River.

Comment 4. There is only one BURP site on 35.5 miles of river which is hardly an adequate sampling of the data that the IREAF does collect. The fish data collected by USGS and IDFG is also a hardly representative sampling of fish presence in the river. Lower Priest River should not be removed from consideration for a sediment TMDL until a more comprehensive survey is completed. The survey should include actual measurement of fine sediment levels in the river.

Response 4. The sediment TMDL for Lower Priest River recommends additional BURP sites for monitoring during the TMDL Implementation phase. Fisheries evaluation is difficult within the river due to insufficient in-and-out points for river electro-fishing boats. The TMDL recommends that IDFG conduct ecological evaluations for Lower Priest River and establish cold water fisheries targets.

Sincerely,

Glen Rothrock
DEQ Watershed Coordinator

IDAHO DEPARTMENT OF LANDS

3780 Industrial Ave. South
Coeur d'Alene, ID 83815
Phone (208) 769-1525 Fax (208) 769-1524

WINSTON WIGGINS - DIRECTOR

November 8, 2002

Glen Rothrock
Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, Idaho 83814-2648

Dear Glen,

Thank you for the opportunity to comment on the draft report, *Addendum – Priest River Subbasin Assessment and Total Maximum Daily Load.* This draft has been reviewed by personnel from the Idaho Department of Land's (IDL's) Priest Lake Supervisory Area and IDL's Interdisciplinary Team (ID Team). The ID Team has prepared a report of their comments which is attached (Attachment 1).

IDL would like to have the following points considered in the final report. Documentation and/or justification for these points are more fully presented in the ID Team report.

1. The *Addendum* cites data from *draft* Idaho Department of Lands Cumulative Watershed Effects (CWE) Reports. Reviews of these reports indicated some errors in the calculation of the Hazardous Risk Ratings for the North Fork and the Middle Fork of East River. These have been corrected and new data is shown in the ID Team comments.

2. IDL questions the need for a sediment TMDL process on the East River. The Middle Fork and North Fork of the East River represent 95% of the drainage area of the East River. The Middle Fork and North Fork have been determined to be in full support of beneficial uses. IDL acknowledges adverse conditions in the main stem of the East River, but believes the causes are attributable to land management activities directly adjacent to the main stem.

3. Page 49 of the *Addendum* states "There is also evidence of an accelerated spring peak flow from the Middle Fork East River due to watershed canopy removal". We do not believe this statement can be substantiated by existing documentation.

4. Recent fish surveys indicate that the Middle Fork of East River and its tributaries are supporting thriving populations of bull trout and other salmonids. The bull trout in particular appears to be increasing in numbers.

Glen Rothrock
November 8, 2002
Page 2 of 2

5. Figures 8b. and 12b do not accurately depict the state grazing lease area. There no longer is any active grazing in the Middle Fork and North Fork drainages. The legal description for the grazing lease within the main stem of East River drainage is provided in the ID Team report. Attachment 2 shows the correct lease boundary.

In conclusion, the IDL questions if a TMDL listing for sediment is warranted for the East River drainage. We recommend focusing time, energy and money on identifying and mitigating the land use activities that are having a direct impact on the main stem of the East River. IDL will be more than willing to participate in any cooperative projects directed towards fully supporting beneficial uses in the East River.

Sincerely,

Roger C. Jansson

Roger C. Jansson
Operations Chief – North

Attachment 1– ID Team Comments
Attachment 2 – Grazing Lease Boundary

Cc: Winston Wiggins, Director
Ron Litz, AD-Forestry & Fire
Mick Schanilec, AS-Priest Lake
Craig Foss, BC-Forestry Assistance
Scott Marshall, Engineering Geologist
Douglass Fitting, Forest Hydrologist
Chris Tretter, Fish Biologist

January 24, 2003

Roger Jansson
Operations Chief - North
Idaho Department of Lands
3780 Industrial Ave. South
Coeur d'Alene, ID 83815

Dear Roger:

Thank you for providing comments on the draft report, *Addendum – Priest River Subbasin Assessment and Total Maximum Daily Load*. Four letters of comment were received by the end of the extended public comment period. The comments received resulted in two major changes to the draft *Addendum* as incorporated in a revised draft document (enclosed): 1) sediment was retained as a pollutant of concern for the Binarch Creek §303(d) listing, and a sediment TMDL was prepared (pages 89-96), and 2) sediment was retained as a pollutant of concern for the Lower Priest River §303(d) listing, and a sediment TMDL was prepared (pages 125-136). There will be an additional public comment period for this revised draft. If your organization has any further comments, please supply them to me by March 7, 2003.

The comments as we understood them from IDL are listed below, followed by DEQ's response. Comments are addressed in the IDL cover letter as detailed within the *Attachment 1 – ID Team Comments*. If a revision was made to the draft *Addendum* report, this is noted. All comment letters received and DEQ's response letters are included in Appendix D of the revised draft subbasin assessment and TMDL document.

Comment 1. The *Addendum* cites data from draft IDL Cumulative Watershed Effects (CWE) Reports. Reviews of these reports indicated some errors in the calculation of the Hazardous Risk Ratings for the North Fork and Middle Fork of East River. These have been corrected and new data is shown in the ID Team comments.

Response 1. The revised HRRs, as described within pages 1 – 2 of Attachment 1, are duly noted, and the correction will be made in the *Addendum* report.

Comment 2. IDL questions the need for a sediment TMDL process on the East River. The Middle Fork and North Fork of the East River represents 95% of the drainage area of the East River. The Middle Fork and North Fork have been determined to be in full support of beneficial uses. IDL acknowledges adverse conditions in the main stem of the East River as well as lowermost Middle Fork, but believes the causes are primarily attributable to land management activities directly adjacent to the main stem and lowermost Middle Fork.

Response 2. The starting point is that both DEQ and IDL agree that measured and observed conditions within the main stem East River shows water quality impairment, or Not Full Support of beneficial uses. DEQ maintains that excess sediment load into the main stem cannot be discounted as a contributing cause to impairment. Thus, a sediment TMDL is required. It has been DEQ policy statewide that if a lower water body segment shows impairment, in part by sediment, then a sediment TMDL will encompass the entire watershed upgradient of the impaired segment regardless of whether upper segments are Full Support.

DEQ acknowledges that there are land uses adjacent to the main stem, i.e. large animal grazing on private property, that have caused severe stream bank damage and sediment load. The Idaho Soil Conservation Commission will address these land uses in the TMDL Implementation Plan. However, there is also a rather extensive road and stream crossing network on state and federal lands of the Middle Fork watershed, and on state lands in the North Fork watershed. The sediment load calculations of Table 23 and 24 (in the revised draft *Addendum*) for these watersheds primarily come from this road network. Because of the high-energy nature of the two Forks, sediment input will largely be transported to the lower reaches of the forks and the main stem. IDL has never supplied alternative calculations or documented assessments in regards to sediment load from the state road network. Therefore, our sediment calculations and load allocations will remain unchanged at this point.

Given the above explanation, it is emphasized that the TMDL Implementation Plan phase, with a Watershed Advisory Group, will give the opportunity to develop site and project specific plans for sediment reduction. Project specific plans will focus more on known and prioritized sediment sources rather than generalized TMDL calculations and load allocations. Past improvements that IDL has made within the road system of state lands can be documented and considered. Also, areas of the road system that are identified as a known sediment source problem can be documented, and placed on a priority list for improvement projects.

Comment 3. Page 49 of the Addendum states "There is also evidence of an accelerated spring peak flow from the Middle Fork River due to watershed canopy removal." We do not believe this statement can be substantiated by existing documentation, and we conclude that hydrologic adverse conditions do not exist sufficient to require the development of CWE drainage wide site-specific BMPs.

Response 3. The revised HRR for the Middle Fork, combining Channel Stability Index = 44 with Canopy Removal Index = 0.47, still results in a HRR with a "high-end moderate" rating. Of the twenty, 5th or 6th field watersheds assessed by the CWE protocol in the Priest River Subbasin between 1994 - 2000, the Canopy Removal Index of the Middle Fork is the highest recorded. To me, this raises a red flag.

However, after reviewing Attachment 1, pages 1 – 7 (CWE Hydrologic Risk Rating, relationship between hydrologic assessment and stream channel stability, East River geology, and other impacts), I agree that that there is insufficient quantitative information to substantiate the statement cited in Comment 3 above. I will revise the statements relating to Middle Fork spring peak flows and suspected impacts such as channel widening that appear on pages 9, 10, 49, 84, and 100. I would suggest though, that the observed HRR of the Middle Fork warrants on-the-ground hydrologic assessments by IDL, such as a gauge station for measured discharge, rather than relying solely on some of the theoretical narrative offered in Attachment 1 to explain the HRR.

Comment 4. Figures 8b and 12b of the *Addendum* do not accurately depict the state grazing lease area. There no longer is any active grazing in the Middle Fork and North Fork drainages.

Response 4. Changes to the GIS grazing lease areas will be made and reflected in revised report maps.

DEQ Technical Services Unit - Boise
Review of Binarch Creek and Lower Priest River Summaries

Binarch Creek

It seems logical to overturn WBAG when the BURP sites were in beaver complexes where you would not expect substrate and bugs to be as good as a higher gradient, flowing stream. (It does beg the question of why we are BURPing beaver complexes when we know the outcome, but I guess that is live and learn.) The next obvious question is "what evidence do we have that other, higher gradient, non-beaver areas, are in good shape?" Another way to phrase this might be "where do the cutthroat spawn and what condition is their spawning areas?"

You have good evidence that the cutthroat population is in good shape. The USFS data shows good SFI scores wherever they sampled. Strong evidence that they are at least spawning.

But, you also have a statement on page 40 that a USFS survey shows that fines were somewhat high in gravel areas. Taken on face value, this suggests that anywhere in the creek where they found gravel (i.e. spawning areas), they were not in good shape.

If that is true, then you have one line of evidence in support of your position (good SFI scores), and one line of evidence not supporting your position (heavy fines in gravels). And it would be wise to err on the conservative side and do the sediment TMDL.

If the statement regarding the USFS survey is out of context, then this statement needs to be revisited. In other words, if they were surveying gravels in beaver complex areas, then that is a different story. Because right now the statement implies that all gravel (potential spawning) areas are impacted by sediment.

Lower Priest River

Overall, the data support your decisions regarding temperature and sediment in Lower Priest River. All indicators suggest that low RFI scores are probably a result of temperature, and as you say, that may be irreversible.

On page 59, the second paragraph makes reference to streambank erosion surveys showing raw banks in some areas. It would help your argument if you could place that statement in the context of how much of the total bank length is in such a condition. In other words, if the raw areas represent less than 20% of the total bank length, then it is reasonable to assume that bank erosion is not well above background levels.

Also, is there anything that can be said about the sediment delivery from tributaries? If the tributaries are all listed for, and indeed impacted by sediment, then there may be a hole in your argument. However, if sediment delivery from tributaries is in general not out of whack, and the bank erosion is not extensive, then you have your argument covered from a source perspective as well.